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# HOUSE DRAINAGE

—IN—

## NEW HAVEN.

—BY—

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NEW HAVEN, CT.

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## HOUSE DRAINAGE IN NEW HAVEN.

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NEW HAVEN, CT.

Abstract of a paper read before the New Haven County  
Medical Society, April 17, 1884.

**S**ANITARY science as distinct from personal hygiene is defined to embrace the applied science of so directing and restraining the action of a community as to secure the health of the community.

The application of this idea to the plumbing and drainage of dwellings is by far the most urgent need of this conservative city, which has as yet adopted absolutely no system of plumbing, and exhibits antiquated and dangerous methods in most of its houses, whether pretentious or humble.

We will venture to take up the first part of the problem and after showing how houses in New Haven are now drained, we will inquire what would be the best system, leaving for future consideration the second and most difficult part of the problem,—by what steps our city can be induced to adopt measures of regulation and supervision.

It should here be premised that the soil of New Haven is mainly gravel, and that its sewers belong to two epochs. Previous to 1871 they were a miserable combination, built almost without reference to each other or to the needs of the city. At that time a fine and extensive scheme was adopted. About seven miles of the old sewers were repaired and utilized, and our sewerage now consists of about forty miles of excellent conduits, well adapted to the requirements of the community if it will but avail itself of them in an intelligent manner.

From various sources I estimate that there are in the city 10,000 dwellings.

Of these 2,253 have been connected with the sewers since 1871 and their drains plotted on a map.

Of the number and location of drains joined to the old sewers previous to 1871 nothing is known.

During the past year 232 dwellings have been erected and about 341 buildings, old and new, have been connected with the sewers.

It will be seen that about one-fourth of the total number are known to connect with sewers, and that many of the new houses, and at least a hundred old ones were thus joined during the past year.

Finally, the drainage of all these new houses and the remodeling of many old ones is done without regulation or inspection, and thus these valuable opportunities for improvement may continue to be squandered at this rate year after year.

Masons and drainlayers are obliged to connect with the sewer in a manner satisfactory to the engineer, but from this point, back to and throughout the house, there is no supervision, and the drainage is generally defective.

Drains have been laid with inadequate slant, level or even pitching the wrong way. They are commonly laid in crooked lines, with leaky joints, and so irregular on their inner surfaces as to induce obstruction, partial or complete.

Filthy leakage into and under cellars results in a long train of nuisances and sickness. Leakage is especially liable to occur if, owing to excessive rainfall, the sewage backs up into such defective drains.

At these times the engineers are besieged with complaints from householders that the sewer is stopped up. They are regularly informed that their drains are probably out of order, and in most cases this proves to be true.

Even the larger sewers are calculated for not more than one inch rainfall per hour, half of the inch to be disposed of in that time, and it is impracticable to build

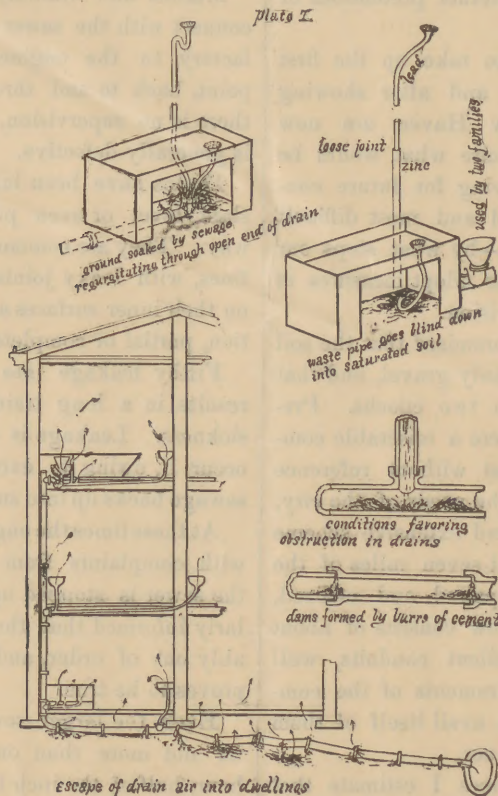


sewers large enough to accommodate the severest storms. The result is that when at times the fall exceeds one inch per hour sewage necessarily backs up a certain distance in the drains, and hence the special need of having these water-tight and also of having the lowest fixtures in the house sufficiently above the level of the sewer.

For years the cellar under the City Hall was in a wretched condition on account of sewage backing from the Church street sewer, which belongs to the old system and is doubtless too small. However, when the drain was properly relaid the trouble ceased.

There are defects dependent upon cement which has been forced into the joints of pipe, and not being wiped off projects into the current of sewage in a series of hard burrs, and is thus often the nucleus of complete obstructions or the

cause of partial retention of decomposing matter within the house. Leakage from hidden drains frequently saturates the soil under our houses, and fermenting there, sends up gases which rise through the ground and readily diffuse into the air of apartments. This source of tainted air is especially liable to be drawn upon in winter, when the windows are closed and stoves and furnaces are creating a strong draft from the cellar up through the house. It must be evident that these vapors of putrefaction can be generated just as easily in a cesspool, or in the house pipes themselves, as in the sewer or in the ground under the house. This extension of the ill-fame of sewer gas to cesspool gas and drain gas, is very desirable, and hundreds of dwellings are unguarded against the entrance of these effluvia from filthy and unventilated pipes and cesspools.



The diagrams presented are selected | be self-explanatory. Plate I. shows how  
from my sketch book and are designed to | sewage may be discharged at various

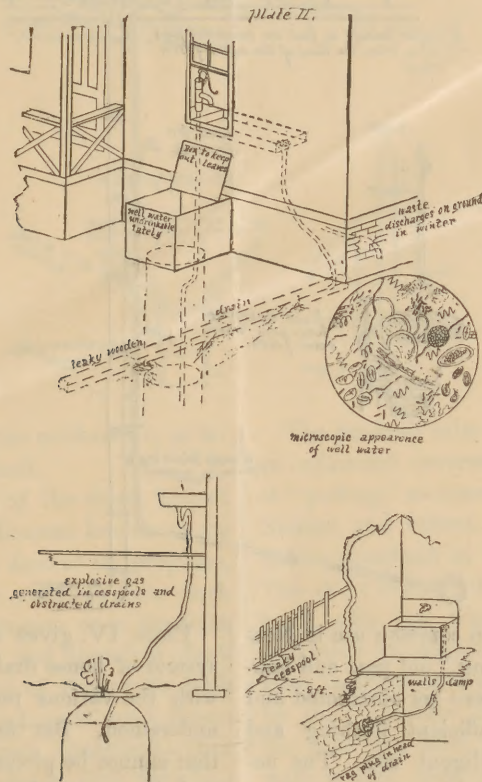
points and also how gas may enter the house, generated either in the sewer, cesspool, in the ground under the house, or in the house pipes themselves, which are often more foul than either of the other sources.

In the older dwellings nothing is done to prevent this entrance of gases through the pipes. In the modern the trap delusion is leaving its record, although ten years ago the folly of trusting to these alone for protection was demonstrated. Repeated experiments with bent glass tubes filled with water proved that gases introduced into the lower or sewer side of traps readily diffuse through the so-called seal and are quietly given off from the upper surface of the liquid in from fifteen minutes to four hours, depending upon the gas used.

In hundreds of dwellings there is no provision either for the entrance of fresh air into drains or for the exit of drain-air from the soil pipe. Thus gases pass unchecked into rooms, or diffuse through traps, or when pressure occurs force bodily through these into the house.

The rapid filling of unvented drains and cesspools, or the rapid generation of gas in such very commonly causes pressure enough to overcome the slight resistance offered by water traps. The sudden discharge of a volume of hot water into certain pipes produces the same result, and one may frequently hear in houses thus conditioned the gurgling of stinking, or perhaps, odorless gas, as it bubbles up through the seal.

Many cases have come to my notice where the gas of an obstructed drain or



unvented cesspool has exploded, and that figured on plate II. is selected because it also indicates the strong passion people

have for close communion with filth pits. The refusal of the sink water to descend led to the tapping of the cesspool by



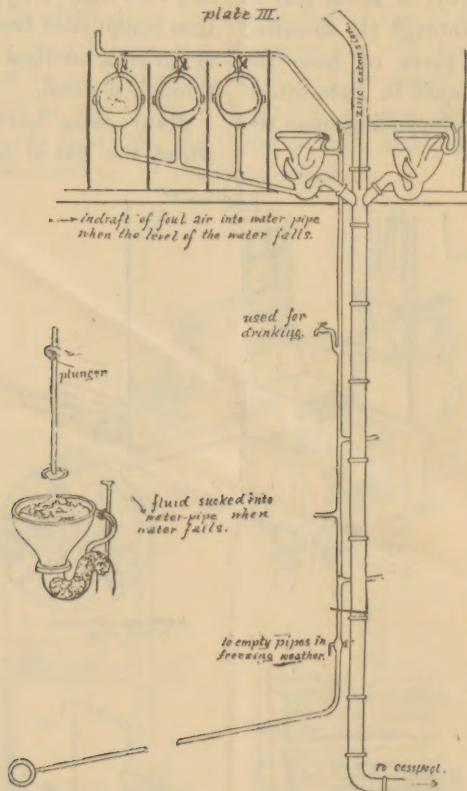
candle light and the resulting explosion.

Sometimes there exists a liability to the pollution of drinking water, as illustrated on plate II., where a hidden and leaky drain is situated near a well. A sketch of the microscopic appearance of this water shows the presence of alga, infusoria, bacillus, a nematode worm, starch grains, spirillum and bacterium termo in abundance. It is interesting to note in connection with this water that, although the family drank it nearly the year round, yet it had not produced any of the zymotic diseases; showing conclusively,

so far as one case could, that water requires the presence of some special condition in addition to filth to make it the bearer of an essential fever.

The usual method of flushing closets directly from the water supply pipes, is calculated to favor the pollution of drinking water in these pipes. When owing to inadequate pressure the water falls away from the closet, gaseous and even liquid filth may be sucked through the open valve into the pipes, and on the return of pressure the water may be contaminated.

Plate III. illustrates this and also fig-

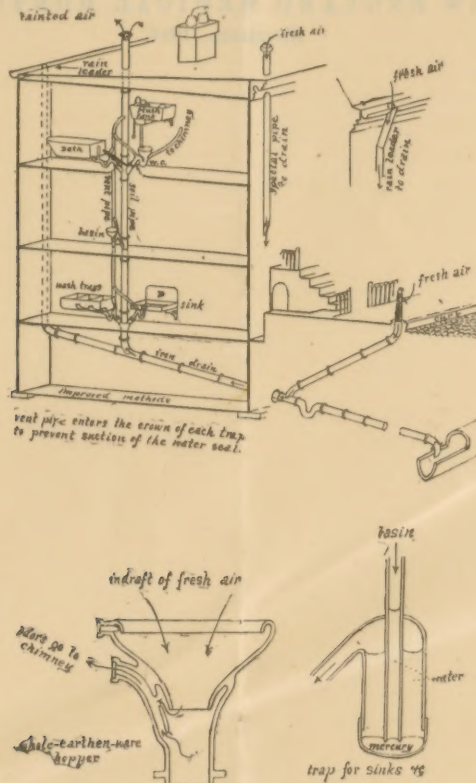


ures an instrument in common use in New Haven for "plunging" out pan and hopper closets where these are obstructed and filled up from insufficient flushing and careless and unintelligent use. The necessity for such a tool is strong presumptive evidence of the pressing need of inspection and limitation of the use of these fixtures.

Plate IV. gives a general idea of the system of house drainage most consistent with the various requirements at present understood. But there is one requirement that cannot be pictured, and this is skilled and honest workmanship, which can be secured on a large scale only through careful supervision of the work by a responsible person interested in the dis-

covery of defects and not in concealment. It will be observed firstly, that the drain is partially isolated from the sewer by a trap which may occasionally be forced. Secondly, a constant current of fresh air throughout the pipes can be secured so that no deleterious gas need exist inside

the house walls, except in an extremely diluted state. If, thirdly, even this nearly pure air be effectually barred out of the rooms by mercury or water traps carefully guarded from accident, it would appear that periodic inspection and repair would be the final requisite to make our homes



as safe to live in as the outdoor air, so far as drainage is concerned.

Some modification of the closet figured on plate IV. is the cheapest known to me that can be made to answer all purposes, and these should be supplied with flush tanks, except in basements or in locations where an unfailing and abundant flush can be secured. One of these with flush tank complete can be bought more cheaply, and will prove more trustworthy than the expensive plug closets with their hidden mechanism, liable to concealed fouling and to the danger incident to direct flushing from a valve in the water pipe.

The fresh air inlet to drains is liable to an occasional reversed current of foul air or "puffing," as observed by Bowditch at Nahant, and others. This constitutes a serious drawback to some plans proposed. The short vertical inlets advised by Gerhard, with the warning to avoid close proximity to windows, seems to be very often impracticable, and the plan endorsed by the "Sanitary Engineer" of leading the pipe to a catch basin under the sidewalk is also open to objection, as in our climate the inlet would be clogged by snow, ice, and the filling of the basin with dirt.



To overcome these difficulties I have devised a hollow hitching-post at the curb which continues the pipe to such a height that the inlet is above the influence of these accidents and at the same time is farthest removed from the windows of a city house. It can also be easily flushed by pail or hose.

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